

Encouraging the introduction of energy efficient and lower carbon road vehicles through carbon-based taxes at purchase

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Abstract

Road transport is responsible for about a quarter of Europe's total emissions of carbon dioxide, and the sector's share of the total has been growing. Policies designed to reduce road transport's contribution to climate change, and to meet Kyoto targets, are an important focus for decision-makers. (Targets are likely to be legally binding following Russia's expected ratification of the Kyoto Protocol.)

European car-makers have made voluntary commitments to reduce average new car fuel consumption by around 25%, but success in reaching this target – and exceeding it – is partly dependent on market demand for lower carbon vehicles. Appropriate tax incentives are an important part of the policy mix for encouraging sales of environmentally-preferred products. The point of purchase is the most important moment for exerting influence on consumer decisions.

There is no consistent system in European countries for levying differential carbon-based taxes on vehicles at purchase. Car producing countries including France, Germany, Italy and the UK do not have significant purchase taxes, charging only VAT at sale. However, Austria and Portugal, for example, integrate fuel consumption or CO₂ emissions as a component in vehicle purchase taxation. Some economic studies have shown that such schemes can encourage significant environmental improvements with low economic and political costs.

This paper aims to describe the existing national systems for vehicle purchase tax across Europe, identifying the most promising routes for achieving environmental, economic and social objectives.

Introduction

Rising emissions of greenhouse gases (GHGs) such as carbon dioxide are of increasing concern to policy makers as evidence of human-induced climate change increases. Transport is the fastest growing source of these emissions and there is particular concern over the growth in air travel. Road transport is, however, responsible for most of the transport sector's 20% of total world GHG emissions and this share is rising.

In Europe, the main focus of past environment policy in connection with road transport has been on the control of local pollutants such as particulates and oxides of nitrogen, as well as other emissions harmful at the local level. These emissions have been controlled through a gradually increased tightening of motor vehicle pollution standards. (Euro III regulations are now in force for new vehicle sales with Euro IV due to take effect in 2005.) These regulations have been effective in significantly reducing the local pollution emitted by traffic.

However, of increasing concern to policy makers are the rising emissions of greenhouse gases (GHGs) such as carbon dioxide which are believed to be causing climate change.

The EU as a whole is obligated under the Kyoto Protocol to cut GHG emissions 8% by 2012, compared with 1990. The EU's GHG emissions fell 2.3% between 1990 and 2001, but projections suggest that business-as-usual will produce

a *rise* in emissions between 1998 and 2012. Of the EU-15, only Luxembourg, Germany, Sweden and Britain are 'on-track' or ahead of a straight-line path towards their Kyoto targets. (15 Europa, 2004)

A variety of policy initiatives have so far been undertaken across Europe to limit emissions of carbon dioxide from motor vehicles. Europe is, however, relying heavily on voluntary agreements with European car manufacturers. The European car makers' association, ACEA, has agreed a target of 25% reductions in average new car CO₂ emissions to 140 grams per kilometre (g/km) by 2008. (The Japanese and Korean car makers' associations, JAMA and KAMA, have agreed to similar targets). The agreement is meant to deliver 15% of the EU's entire commitment to cutting greenhouse gas emissions under the Kyoto Protocol.

The European Commission has set a target of further reducing average new car CO₂ emissions to 120 g/km (20 g/km below the car makers' target by 2010, at the latest). It might be noted here, though, that even if the EC target of 120 g/km were achieved by 2010 – and it currently looks impossible – total Community emissions of CO₂ would still be 3% higher in 2010 than they were in 1995. Without behaviour change, this level of technical improvement is required merely to stabilise total emissions from the road transport sector. (24 EC, 2002)

The European Council endorsed a strategy in 1996 to reduce CO₂ emissions from new cars based on three 'pillars' – (1) Car industry commitments on fuel economy improvements; (2) Fuel economy labelling and; (3) Fiscal measures. (24 EC, 2002)

This paper sets out to review the current situation regarding the third 'pillar', particularly focusing on the role of purchase – or registration – taxes on motor vehicles across Europe and begins to analyse the prospects for these to be used to achieve the environmental objective of cutting GHG emissions. The paper will also provide comment on the inter-relationships between purchase taxes and other vehicle and fuel-based taxes designed to cut motor vehicle carbon output. It provides a view on whether a carbon-based purchase tax (or tax/subsidy system) could fit comfortably into the fiscal mix.

Taxes on Motor Vehicles in Europe

Taxes on motor vehicles within the European Union can be broken down into three distinct categories:

(i) taxes on purchase; (ii) taxes on ownership; and (iii) taxes on use (fuel taxes, road tolls and congestion charges).

The various taxes on motor vehicles are a major source of revenue for European governments. The total revenue gained from vehicle taxation (including the types of taxes detailed above plus driving license fees, insurance taxes, tolls, customs duties and other taxes) is now worth around 340 bn Euro (1 ACEA, 2004). The total tax take from vehicle-related taxes is highest in Germany (78 bn Euro), followed by Italy (60.5 bn Euro), the UK (58.7 bn Euro) and France (55.4 bn Euro). The UK's total take from taxes on motor vehicles has fallen since 2002, both in absolute terms and relative to other European countries. This change is

partly due to a freeze in vehicle-related taxes following fuel price protests and partly due to currency fluctuations.

Vehicle Purchase Taxes

In all countries of Europe, taxes are levied at the point of vehicle purchase. In most cases, these are designed as revenue raising measures and it would appear that they do not have an environmental context.

As the following table shows, the most common tax at purchase is VAT, which is levied as a percentage of a vehicle's price. Many countries also levy vehicle registration or sales taxes, with some based on engine size. These have often been designed with equity or redistributive aims in mind, rather than specifically as a disincentive to the purchase of more polluting vehicles.

It is particularly noteworthy that the largest European car markets (Germany, UK and France) levy only minimal 'registration' charges on new cars. Indeed, the main car producing nations (the preceding list + Italy) levy very low sales or registration taxes. Few European countries levy significant purchase taxes (other than VAT) on commercial vehicles (Denmark, Greece and Ireland being the exceptions).

The total burden of combined VAT and purchase taxes on the total price of a typical new car (2 000 cc) varies markedly across Europe, from just 15% in Luxembourg to nearly 200% in Denmark. In the four biggest car markets the additional tax component on the purchase of a new vehicle varies little, however. The additional tax varies from 16% in Germany, to around 20% in Italy (France and the UK lie between the two). Even in these large markets that are relatively low down the scale of purchase taxes on vehicles, these taxes still represent a significant addition to the price paid by consumers for new vehicle purchases.

The Impact of Different Rates of Purchase Tax in European Markets

The primary aim of this paper is to ascertain whether there is a potential for vehicle purchase tax to be used to alter the purchase patterns of vehicle buyers to help meet environmental objectives.

It has been shown that purchase taxes are a very significant part of the 'price signal' faced by consumers considering buying a new vehicle and that these range from 15% to nearly 200% of the typical vehicle's purchase price.

For a start, we would expect car ownership rates to be lower in the countries with high purchase taxes. Car ownership levels have been growing rapidly in recent decades; across the EU, indeed, they grew from 291 to 451 cars per 1 000 inhabitants between 1980 and 1998 – an average of 2.5% per year (16 EEA, 2001). But has this overall growth hidden significant differences between markets?

Overall vehicle ownership rates per 1 000 inhabitants are provided below in rank order (highest ownership levels at the top) alongside a column giving rankings for levels of purchase tax (high tax = higher numbers). Figures for GDP/capita are also given, as these are expected to be a very important determinant of ownership levels.

From a cursory glance at the table, it can be seen that there is a closer correlation between levels of vehicle pur-

Table 1. European taxes at vehicle purchase. Sales and Registration Taxes.

	VAT (%)	Passenger Cars	Commercial Vehicles	Registration Charge (Euros unless stated)
<i>Austria</i>	20	Based on fuel consumption Max: 16%	None	165.55
<i>Belgium</i>	21/6	Based on cc + age eg 1.8 litres = 123 Euros	None	31
<i>Denmark</i>	25	105% up to DKK61,400 180% on remainder	95% of value exceeding DKK14,300 (below 2t) 30% of value exceeding DKK34,100 (2–4t)	DKK1180 (Note: 1 Euro = DKK7.75)
<i>Germany</i>	16	None	None	25.6
<i>Spain</i>	16	<1.6 litres: 7% >1.6 litres: 12%	None	65.2
<i>Finland</i>	22	Petrol car: 28% - 650 Euro Diesel car: 28% - 450 Euro	None	
<i>France</i>	19.6	None	None	16–30
<i>Greece</i>	18	New car: 5–50%	New vehicle: 6–26%	100–300
<i>Ireland</i>	21	<1.4 litres: 22.5% 1.4–1.9 litres: 25% >1.9 litres: 30%	LCV: 13.3% Others: 51–127 Euros	None
<i>Italy</i>	20	IPT 2%	IPT	<kw 53: 150.81 >kw53: 3.51 x kw
<i>Luxembourg</i>	15	None	None	28.90
<i>The Netherlands</i>	19	Petrol car: 45.2% - 1540 Euros Diesel car: 45.2% + 328 Euros	None	32–42
<i>Portugal</i>	19	Based on cc Eg 1.6 litres: 5264 Euros	None	85
<i>Sweden</i>	25	None	None	None
<i>United Kingdom</i>	17.5	None	None	£38 (Note: 1 Euro = £0.70)

Source: ¹ ACEA 2004, ²⁰ EC 2004

Table 2. Purchase taxes and car ownership levels.

Country	Cars per 1 000 people	Car ownership Rank (1 = high)	Purchase Tax Rank (1=low)	GDP/capita Purchasing Power Standard (EU 25 = 100)	GDP/capita Rank (1 = high)
<i>Luxembourg</i>	613	1	1	215	1
<i>Italy</i>	545	2	5	107	12
<i>Germany</i>	508	3	2	108	11
<i>Austria</i>	481	4	9	122	4
<i>France</i>	456	5	4	111	10
<i>Belgium</i>	440	6	6	118	6
<i>Sweden</i>	428	7	7	115	8
<i>Spain</i>	408	8	8	98	13
<i>UK</i>	404	9	3	118	6
<i>Finland</i>	392	10	14	113	9
<i>Netherlands</i>	376	11	10	121	5
<i>Denmark</i>	343	12	15	123	3
<i>Portugal</i>	321	13	12	74	15
<i>Ireland</i>	310	14	13	133	2
<i>Greece</i>	254	15	11	81	14

Sources: ¹⁶ EEA, 2001; ¹ Acea, 2004; ¹⁷ Eurostat, Dec 2004

chase taxes and rates of car ownership than between wealth (as measured by GDP comparisons) and car ownership. Some of the richest countries in terms of purchasing power (Denmark, Ireland, Netherlands) are in the lowest third in terms of vehicle ownership. Conversely, three of the bottom

5 countries in terms of per capita income (Italy, Germany, France) are in the top third in terms of vehicle ownership rates.

By contrast, there is a much closer (inverse) correlation between purchase tax rankings and car ownership rates.

Car purchase taxes, GDP and car ownership levels

Car Ownership Rank	GDP/Capita	d	d ²	Car Ownership Rank	Purchase Tax rank (1 = high)	d	d ²
1	1	0	0	1	1	0	0
2	12	-10	100	2	5	-3	9
3	11	-8	64	3	2	1	1
4	4	0	0	4	9	-5	25
5	10	-5	25	5	4	1	1
6	6	0	0	6	6	0	0
7	8	-1	1	7	7	0	0
8	13	-5	25	8	8	0	0
9	6	3	9	9	3	6	36
10	9	1	1	10	14	-4	16
11	5	6	36	11	10	1	1
12	3	9	81	12	15	-3	9
13	15	-2	4	13	12	1	1
14	2	12	144	14	13	1	1
15	14	1	1	15	11	4	16
	Tot:		491			Tot:	116
	Rs =		0.123			Rs =	0.792

Figure 1. Spearman's Rank Correlation Coefficient.

We can show this using a straightforward Spearman's rank order correlation coefficient (r_s) to compare the strength of the link between the ranking for car ownership, first with purchase tax ranking and, second, with a ranking for GDP/capita. These workings are shown in Figure 1.

Using the formula to calculate the Spearman's rank order correlation coefficient ($r_s = 1 - 6 \times \text{sum of } d^2 / (n(n-1)(n+1))$) we can see that the correlation between the level of national purchase taxes and the level of car ownership is 0.792. We can say with a very high degree of confidence that there is a direct link between the two factors. By contrast the correlation (r_s) between GDP/capita rankings and car ownership is much weaker at 0.123.

It is possible to draw the conclusion from this evidence that levels of car ownership are more directly correlated with the level of taxes levied on vehicle purchase than on current levels of income. Perhaps a surprising initial observation which hints at the power of purchase taxes to influence car buying behaviour.

We can also analyse the European data to draw preliminary conclusions about the impact of purchase taxes on the energy (=carbon) efficiency of the vehicle fleets across European countries.

Some European countries have introduced purchase taxes with the specific intention of providing incentives for car buyers to opt for environmentally-preferred alternatives. Denmark and the Netherlands, in particular, have introduced strong purchase tax signals favouring smaller, fuel efficient vehicles while penalising the 'gas guzzlers'. In Denmark and the Netherlands, purchase taxes are graded to encourage the purchase of smaller and/or cleaner vehicles. (Though note that in Denmark the intention of the tax would appear to be as much towards redistribution as environmental performance. The tax benefits are heavily weighted towards cheaper – normally smaller – vehicles.)

In Italy, differential rates of VAT used to be applied to larger, less efficient vehicles (19% on small vehicles vs 38% on large). Though this VAT difference has been withdrawn it would appear to have had an effect on the Italian car market judging by the figures in Table 3.

Table 3. On-road car fuel economy changes (1970 to 1998). (litres per 100 km, gasoline or equivalent)

	1970	1998	% improvement
UK	9.6	9.1 ¹	5.2
France	8.5	8.4 ¹	1.2
Germany (W)	10.2	9.2 ¹	9.8
Italy	8.5	6.8	14.7
Denmark	9.0	7.7 ¹	16.9
Netherlands	9.5	8.1	14.7
USA	17.8	11.8	33.7

* 1995 figures

Sources: ¹⁹ Schipper and Marie-Lilliu, 1999 and ¹⁸ Schipper, Unander and Marie-Lilliu, 2000

Germany has no car purchase tax and a relatively low rate of VAT on vehicle purchases (16%). Likewise, France has no purchase taxes and a moderate rate of VAT (19.6%). The UK had a car purchase tax of 10% on (approximately) 90% of the list price of a new car until 1991 when it was reduced, and abolished completely in 1992. The UK Government's intention was to replace the revenue lost by increasing the level of taxation on road fuels.

It would appear from Table 3 that the European countries that have adopted purchase tax regimes favouring smaller cars also have more fuel efficient national fleets. Of the larger car markets in Europe, only Italy has been successful in reducing average fuel economy significantly since 1970, perhaps because of the existence of the former VAT-induced price signal that encouraged the market dominance of smaller vehicles.

It is noteworthy that since the abolition of the car purchase tax in the UK and despite rapidly rising fuel prices in the early 1990s as a result of the UK's 'fuel duty escalator', the average efficiency of the UK vehicle fleet did not improve significantly. This suggests that a purchase tax oriented towards environmental concerns is a more direct and effective stimulus for the uptake of fuel efficient vehicles than a stringent fuel tax regime.

Figures for the USA are also included in the table to provide an interesting international comparison. US average vehicle efficiency improved dramatically between 1970 and the early 1980s, driven by Corporate Average Fuel Economy (CAFE) legislation, itself based on fears over supply security following the 1970s oil 'shocks'. However, progress virtually stopped – and at times went into reverse – after 1985, and US fuel economy levels remain significantly worse than the European average. The US experience demonstrated that rapid vehicle efficiency improvements can be gained over a relatively short period of time when driven by powerful, comprehensive legislation. The CAFE standards were effective in doubling the average fuel economy of new US cars in the ten years after 1974.

It is important to remember that while the environmental performance of vehicles is an increasingly important concern of policy makers, it has only been significant for the last decade or, possibly, two. (Though with rising evidence of human-induced climate change and the ratification of the Kyoto Protocol imposing binding carbon reduction commit-

ments on signatory countries, it seems that environmental taxation can only increase in significance.) Tax policy in the past has been driven by general revenue raising requirements balanced primarily with economic benefit and social equity considerations.

It is interesting to note that the main European car-making countries have introduced relatively limited or no taxes on vehicle purchase, almost certainly swayed by the perception of the importance of vehicle production to their economies. While environment taxes targeted at the sale of cleaner cars would not necessarily mean that fewer cars would be sold, it would mean that there would be a reduction in demand for larger, high performance vehicles. The European motor industry is competitive and the highest profit margins are made on performance models, with a range of differentiable and, often, energy-consuming characteristics. The established bases of the motor industry are, therefore, unlikely to welcome their governments introducing fiscal policies aimed at reducing the size of these most profitable market niches.

A recent exception to this generalisation has recently been suggested in France where the Government has proposed the introduction of a new 'feebate' scheme. Under this proposal, cars that emit over 180 g/km of CO₂ or diesels without particulate filters would face a surcharge of 1 500-3 500 Euro, whereas cars that emit under 140 g/km of CO₂ and diesels with particulate filters will receive a rebate of 200 to 700 Euro. Cars in the interim (140-180 g/km band) will receive neither a surcharge nor a rebate. It is possible that the French Government sees that the country's economic and environmental interests may coincide here. France's leading manufacturer, PSA Peugeot Citroen, is at the forefront of the motor industry in the development and sale of smaller, fuel efficient vehicles, particularly those running on diesel.

One of the strengths of the French proposal, and which certainly makes it a more 'saleable' idea, is that it sets out to be broadly 'revenue-neutral'; that is the purpose of the tax change is not to raise revenue but to provide incentives for consumers to change their behaviour in a direction that is preferred from a societal viewpoint. Certainly, from the perspective of political pragmatism, policy-makers are more likely to achieve public acceptance of new taxes if they are set out to have an environmental rather than a revenue-raising focus.

The preceding survey of purchase taxes on motor vehicles in Europe would suggest, indeed, that where they exist they are a highly significant determinant of consumer behaviour in terms of car purchases. They would seem to have an important influence both over the rate of vehicle ownership and over the fuel efficiency of vehicles purchased. We can draw the preliminary conclusion that purchase taxes might be used to exercise a powerful influence over vehicle buying patterns, and that they could be an important tool in a government's armoury for achieving specific environmental objectives.

So how would a more coherent regime of vehicle purchase taxes fit into the current mix of taxes and in what form might they most effectively be introduced?

The Effectiveness of Existing Taxes in Reducing Carbon – Focus on UK

The UK is typical of the largest European car markets in having focused primarily on fuel taxes rather than taxes related to vehicle purchase or use.

While it has been shown that fuel duty rises do have an impact on consumer behaviour, the effect is relatively indirect and the consumer response to the price signal relatively inelastic.

The UK has also experienced serious political problems in its attempts to raise fuel tax levels beyond what was considered acceptable to important sections of the public.

The UK's annually-set 'fuel duty escalator' was introduced in the early 1990s and set out the principle that fuel duty would rise annually in real terms and well above the rate of inflation. After the 'escalator' was raised to 6% above the rate of inflation in July 1997 opposition grew, and escalated in 1999-2000 when it was officially scrapped in its automatic form.

Since the collapse of the fuel duty escalator, UK fiscal policy has focused more on vehicle ownership taxes as a means of delivering carbon dioxide reductions.

Before 2001 the annual rate of road tax, Vehicle Excise Duty or VED, was levied at the same level for all cars, regardless of size. After March 2001, differential rates were introduced according to a vehicle's carbon/energy efficiency and there is now a difference of up to £110 per year between the most and the least-polluting vehicles.

Company cars are a very significant segment of the UK new car market. Around 50% of all new car sales are purchased by companies for business purposes with the remainder being bought by private individuals. Consequently the company car sector is an important target for policies designed to influence the nature and characteristics of the UK car fleet.

From April 2002, company cars in the UK have been taxed on a percentage of their price, adjusted according to vehicles' carbon dioxide emissions (Before 2002, CCT was levied as a proportion of a car's price alone). A minimum CCT liability of 15% of the car's price applies to cars emitting at or below 165 g CO₂/km (2002-3 level), rising to 35% if the car emits over 265 g/km. The carbon dioxide bands are being progressively tightened in 2003-4 and 2004-5, sending a clear signal that high CO₂-emitting vehicles will become increasingly expensive, relative to more efficient vehicles emitting less CO₂.

The UK Government has recently published reports it had commissioned on the impacts of the recent VED and Company Car Tax reforms.

For VED, the Government commissioned a market research company, MORI, to carry out qualitative research into buyer behaviour. The over-riding conclusion was that the graduated VED scheme has had minimal impact on the UK car industry because the tax differentials between the bands are not enough to be a significant factor in the decision-making process. (⁵ MORI, 2003)

The Company Car Tax reform has had more impact on the behaviour of car buyers and sellers. Research by the Inland Revenue suggests that the average CO₂ emissions of new company cars has decreased significantly – by around

Table 4. Average new car CO₂ emissions in the UK (1997-2003).

Year	Avg CO ₂ – g/km	y/y % change	% change on 1997
1997	189.9	-	-
1998	188.4	-0.8	-0.8
1999	185.0	-1.8	-2.5
2000	181.0	-2.2	-4.6
2001	177.7	-1.8	-6.4
2002	174.2	-2.0	-8.3
2003	172.1	-1.2	-9.4

Source: 22 SMMT, 2004

14 g/km – from 1999 (when the intention to reform was announced) to 2002 (⁴ Inland Revenue, 2004). The report suggests that the reform will result in a reduction of 0.5-1 million tonnes of carbon per year – a helpful contribution.

Very recent evidence, however, suggests that there is little scope for increasing the effectiveness of the CCT reform in terms of reducing carbon and, indeed, that company car buyers are changing their policies as a means of avoiding being subject to the tax. In the longer term, its effectiveness as a means of cutting carbon may begin to fall.

While the UK's recent carbon-based vehicle taxes have made a limited contribution to carbon dioxide reduction and have been effective in helping to raise public awareness of the problem, they have not gone anything like far enough to suggest that total UK carbon emissions from the road transport sector will fall in the foreseeable future.

As the table below, shows, while there has been steady progress in reducing the average carbon emissions of new vehicles, this improvement has been more than taken up with the increase in traffic and vehicle use.

It is evident from the UK's experience that current policy measures are insufficient to achieve carbon reductions on the scale likely to be required from the road transport sector by any post-Kyoto agreement on emissions cuts. The UK, though, is better placed than many other European countries in that it is already on course to meet (though probably not exceed as originally planned) its Kyoto targets. It is clear that other policy measures are needed if traffic growth is not to outweigh technical efficiency improvements.

Some other 'soft' policy measures are on the agenda in the UK that will support overall emissions reduction objectives but are unlikely to make a significant impact without tax signals to back them up. The 2005 introduction of an 'eco-label' for all new cars in the UK is an example of such a measure. This measure, a result of a voluntary agreement of car manufacturers brokered by the Low Carbon Vehicle Partnership, will provide a clear colour-coded signal to car buyers on the carbon/efficiency performance of vehicles on display in showrooms. The label will make explicit the link between environmental performance and tax/running costs. A Europe-wide car 'eco-label' (such as exists for 'white' electrical goods) is also on the agenda and likely to arrive before the end of the decade. It is generally accepted, however, that environmental labelling is unlikely to transform the market unless it is backed up by real fiscal 'teeth'. It is just this sort of measure that would be reinforced by the introduction of an environment-based car purchase tax, particu-

larly if this were introduced in a consistent way across the European Union.

Options for the Introduction of a Purchase Tax on New Vehicles

Perhaps the most transparent option for the introduction of a purchase tax signal to encourage the uptake of 'greener' vehicles would be to introduce differential rates of VAT depending on fuel efficiency.

Charging differential rates of VAT on different products has many precedents. A large number of products are charged a reduced or zero rate usually because they are considered to be essential products or services and there is a social equity or access consideration involved. (²⁰ European Commission, 2004)

There has been strong pressure from environment groups the UK, and other members of the Community, for the Commission to approve reductions in the rate of VAT for energy efficient products aimed at the domestic sector. (It is, indeed, anomalous that, in some countries, domestic energy use is taxed more lightly than is spending on equipment to save energy.)

While differentiating between the CO₂-output of new cars by levying differential VAT rates at purchase might be justified using the same arguments as those used to justify discounts for energy efficient products in the domestic sector, the impact of such a policy would be limited by a number of factors.

Firstly, the top VAT rate in some countries is as low as 15 or 16%. Even if the Commission were to allow full VAT exemptions for the most efficient vehicles (unlikely), the financial incentive between the least and most efficient vehicles is limited by the range of VAT levels.

Secondly, VAT differentiation would only directly impact on certain sections of the market. In the UK, for example, around half of all vehicles are bought by companies for their employees use and companies are able to reclaim their expenditure on VAT. Though purchases by companies are lower in most other European countries, significant sections of national markets would not be influenced by VAT changes.

Furthermore, the use of VAT to provide appropriate incentives would not provide a very flexible mechanism for sending environmental signals to car buyers without creating significant administrative complexity. In most countries, VAT rates are set at one – standard – rate, with reduced rates set at a further one or, sometimes, two levels for specific categories of products. Moreover, reducing rates of VAT for the most efficient motor vehicles could encourage a large number of requests for discounts or exemptions for a wide range of other 'worthy' products. Setting such a precedent would be likely to be seen by the Commission as 'opening the floodgates' for other requests.

It seems that other purchase tax options need to be considered to assess whether they might be effective in sending the right financial signals to the whole market.

France's proposed 'feebate' system offers one such solution. It is attractive in that it sets out not to increase the tax burden, but to send an environmental signal while remaining close to fiscal neutrality. It may, however, suffer from ad-

ministrative complexity and require frequent adjustments. Indeed there are indications from France that the proposal may be in difficulty.

Without such a system of taxes and rebates, as proposed in France, it will be more difficult to deliver a transparent fiscal neutrality and thus be more difficult to 'sell' to electorates suspicious of higher and – especially – new taxes. A more straightforward, if less popular, system would impose a sliding scale of purchase tax on new vehicles according to a combination of carbon emissions and list price, while linking the additional revenue raised to tax discounts in related areas. The introduction of carbon-based purchase taxes in this form could be directly linked to car environment labels (such as the new colour-coded UK label) to give a very clear and obvious steer to car buyers about the external environmental costs of the purchase of particular vehicles. The system could be reinforced (as has already occurred with VED in the UK) by also linking the level of annual road (or circulation) taxes – already present in most EU countries – with the environment label bands.

Indeed, purchase taxes can not be considered in isolation of other tax measures relevant in this area; particularly annual road or circulation taxes and charges on vehicle use through fuel taxes. A carbon-based purchase tax introduced without consistent low carbon messages being incorporated into car ownership and usage levies could have undesired effects. For example, larger 'gas guzzlers' could become more popular on the second-hand market, encouraging older, inefficient vehicles to remain on the road for longer than would otherwise be the case. It is important that the right carbon 'signals' are also built into other fiscal levers if the approach is to be most effective.

Conclusions

It is clear from the evidence available that taxes on the purchase of new cars can have a major impact on both the number of cars purchased and on the energy efficiency of the vehicle stock. It seems very probable, indeed, that carbon-based purchase taxes would have a more direct effect on average vehicle efficiency than either taxes levied annually on ownership or on use (through fuel tax). Consumers are known to have very high 'discount rates' so the level of annual road tax would also need to be very high to significantly influence buyers' choice of vehicle at purchase (the threat of moderate future costs, paid yearly, is not a highly significant factor to consumers). Fuel taxes, while very good for tax revenue generation, have also been shown to send weak signals to consumers to buy more efficient cars, or use their cars less. Fuel prices need to rise significantly to have much impact on use (demand is inelastic to price changes). By contrast, carbon-based taxation of new cars is a direct, easily comparable and immediate signal to car buyers at the point of purchase.

This is not to say that annual road or usage taxes should be ignored. Indeed, to do so could have undesired consequences and would weaken the strong signal given in the form of a carbon-based car purchase tax.

The European Commission agrees^(24 EC, 2002) that carbon-based taxes on car purchase are an effective influence on buyers and could form an important part of the third 'pil-

lar' of the Community's strategy for reducing GHG emissions from the road transport sector.

But – and this is a very big 'but' – in the same communication as acknowledging their power and potential – the Commission says that registration (purchase) taxes should not be encouraged. In fact, the Commission says that they should be gradually reduced with a view to their total abolition. The Commission wants to see a gradual shift of taxation from registration taxes to annual circulation taxes because "the priority is the smooth functioning of the internal market". Registration taxes are seen as the worst element of the differences in the vehicle tax systems between the member states that have resulted in "tax obstacles, distortions and inefficiencies."^(24 EC, 2002)

The Commission's view, expressed in the 2002 communication, contrasts strikingly with the priority accorded to beating the challenge of climate change by leading national politicians. Indeed, UK Prime Minister Tony Blair (who assumes the chair of the EU with the UK's presidency later in 2005) has described climate change as "the greatest challenge facing the planet" and "a greater threat than terrorism." (It is rather hard to imagine a threat to the free-rein of competition across the Europe market – which is anyway already replete with obstacles and distortions, as the Commission acknowledged – being discussed in such apocalyptic terms!)

As the perceived threat of climate change has grown further – and as the road transport sector represents one of the largest and most intractable problems in terms of GHG emissions – the Community may have to reconsider its priorities in this context, in terms of balancing competition objectives with the preservation of a stable natural environment.

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Abbreviations

GHG	Greenhouse gases
ACEA	European Association of Car manufacturers
JAMA	Japanese Automakers' Association
KAMA	Korean Automakers' Association
VED	Vehicle Excise Duty
CCT	Company Car Tax
VAT	Value Added Tax
DfT	Department for Transport (UK)
LCV	light commercial vehicle
HGV	Heavy goods vehicle